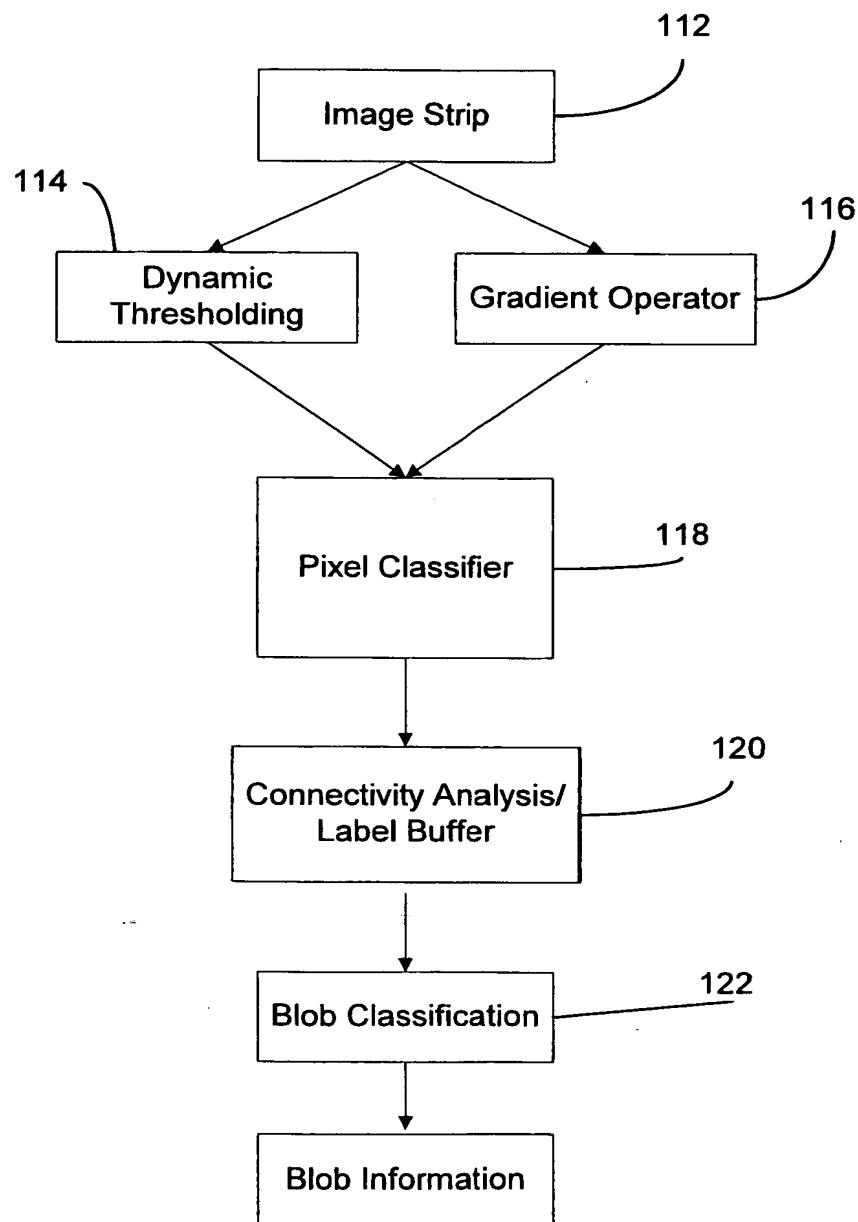


FIG. 3



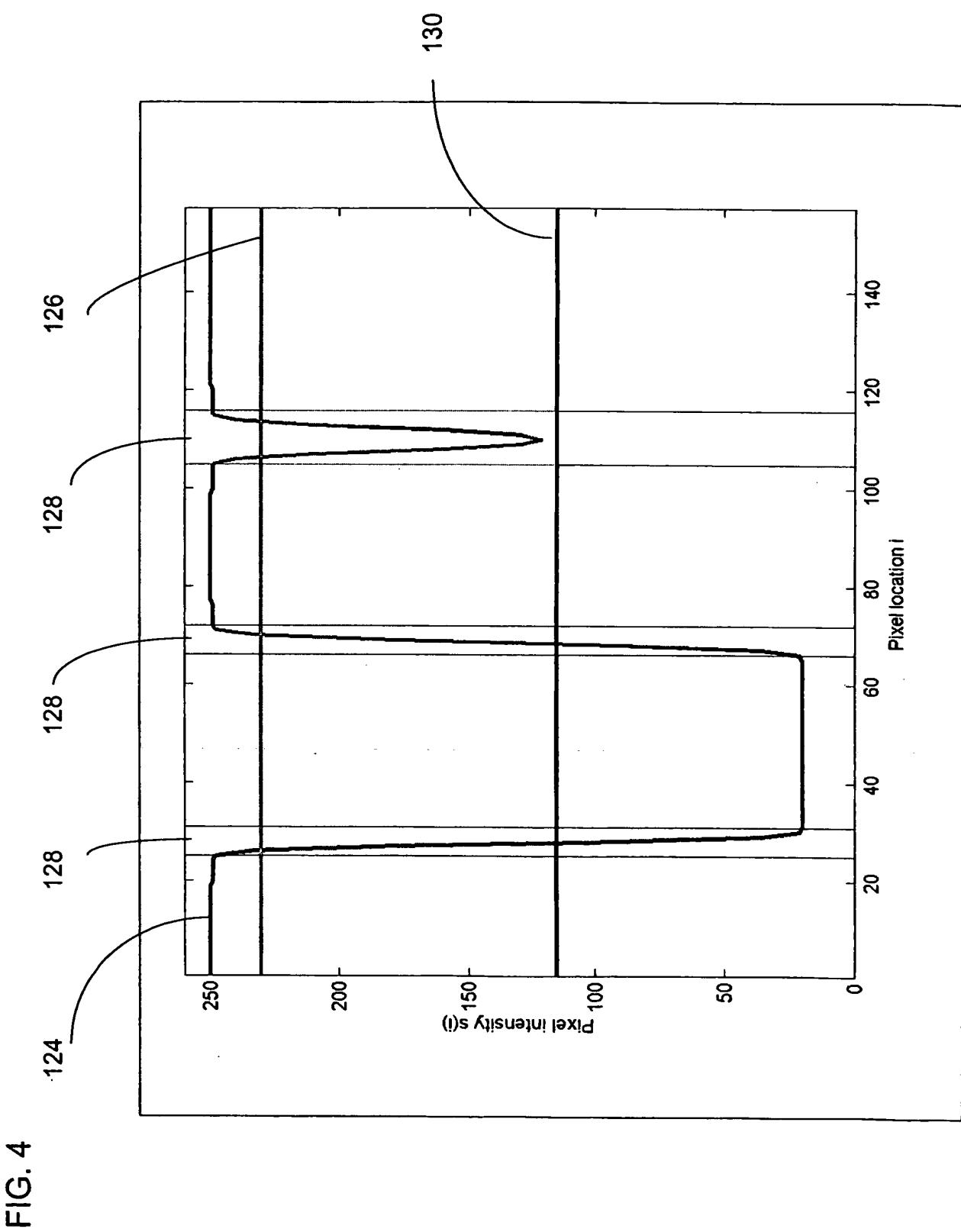


FIG. 5

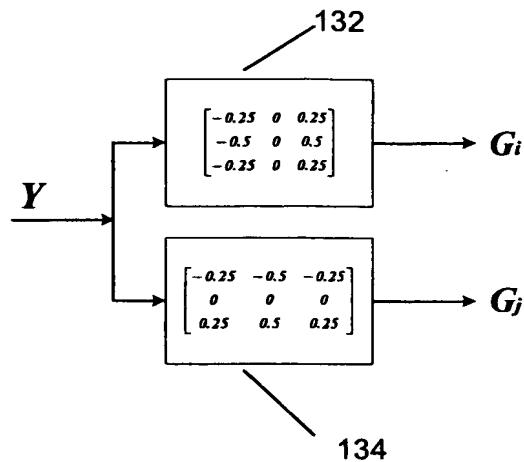


FIG. 6

$$C(Y, \|\nabla Y\|, Chroma) = \begin{cases} \text{WHITE,} & chroma < T_c \text{ AND } \|\nabla Y\| < T_e \text{ AND } Y \geq T_w \\ \text{WHITE EDGE,} & chroma < T_c \text{ AND } \|\nabla Y\| \geq T_e \text{ AND } Y \geq T_w \\ \text{GRAY,} & chroma < T_c \text{ AND } \|\nabla Y\| < T_e \text{ AND } T_g \leq Y < T_w \\ \text{GRAY EDGE,} & chroma < T_c \text{ AND } \|\nabla Y\| \geq T_e \text{ AND } T_g \leq Y < T_w \\ \text{BLACK,} & (chroma < T_c \text{ AND } Y < T_g) \text{ OR } Y \leq 30 \\ \text{COLOR,} & chroma \geq T_c \text{ AND } \|\nabla Y\| < T_e \\ \text{COLOR EDGE,} & chroma \geq T_c \text{ AND } \|\nabla Y\| \geq T_e \end{cases}$$

(Equation 2.)

FIG. 7

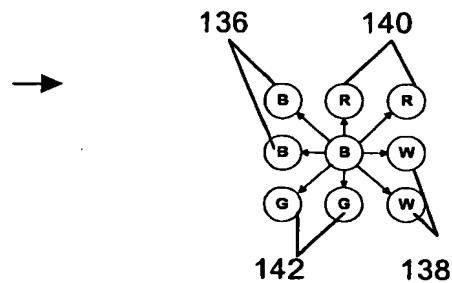


FIG. 8

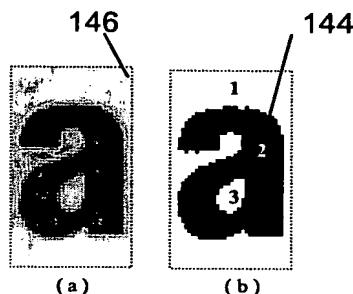


FIG. 9

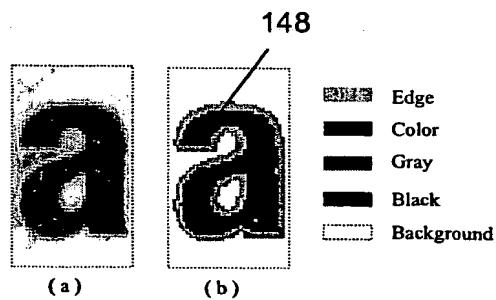
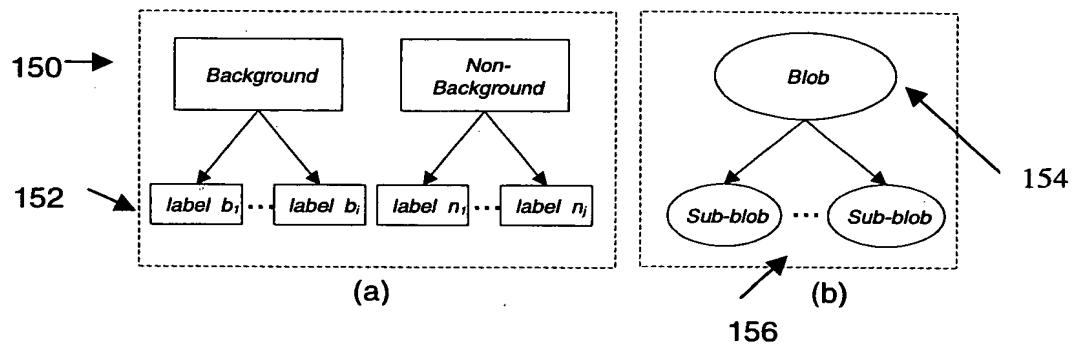


FIG. 10



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FIG. 11

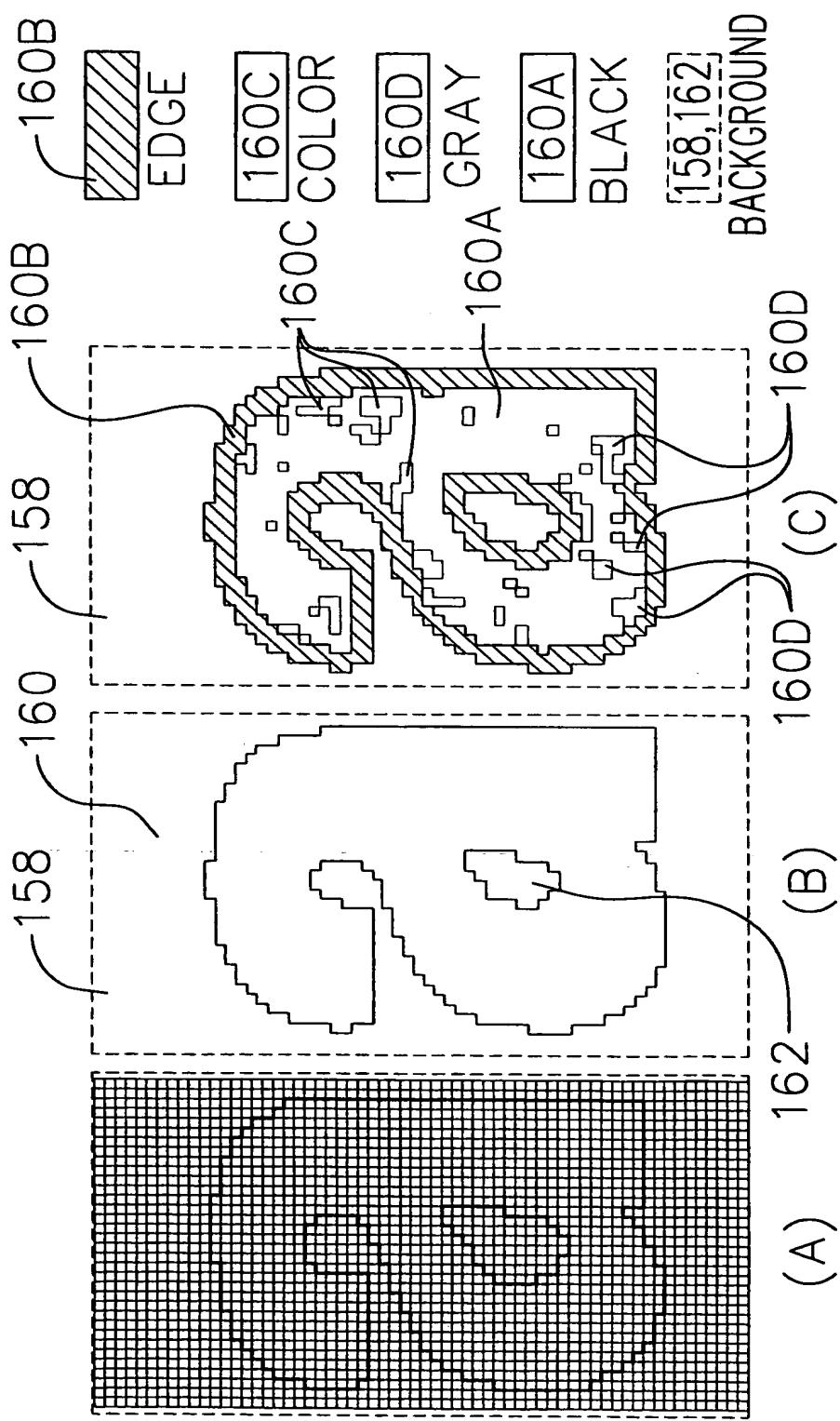


FIG. 12

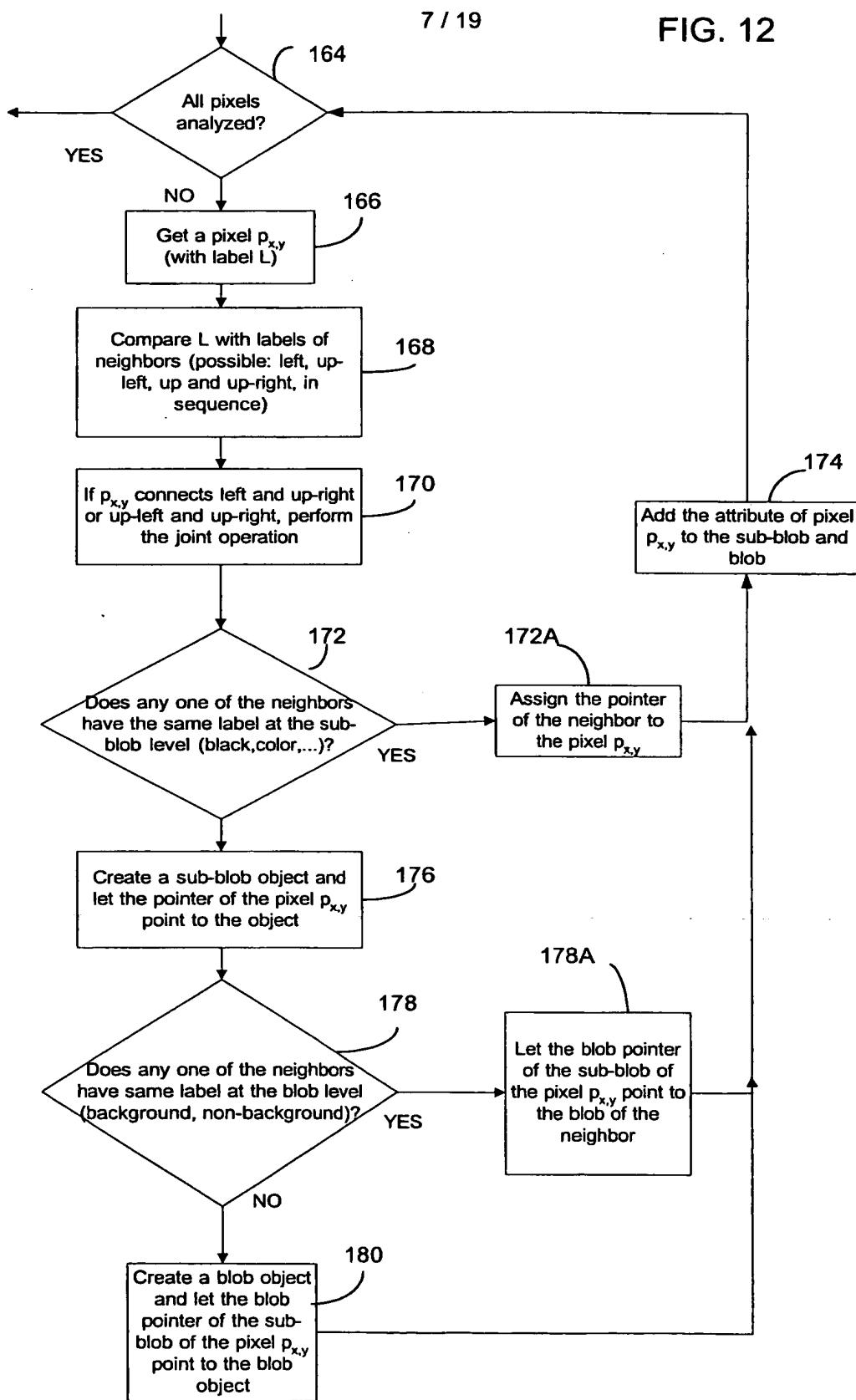


FIG. 12A

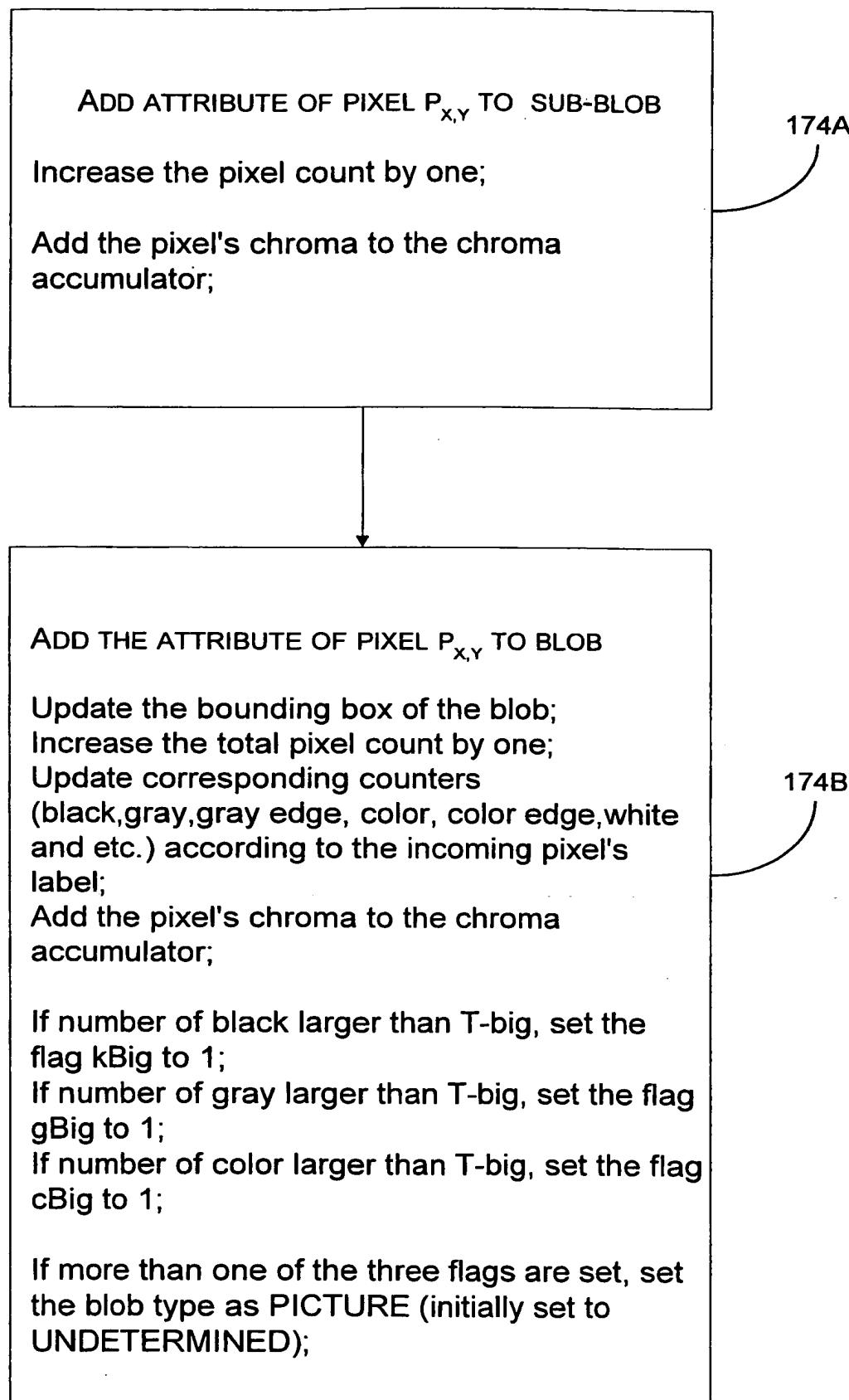


FIG. 13

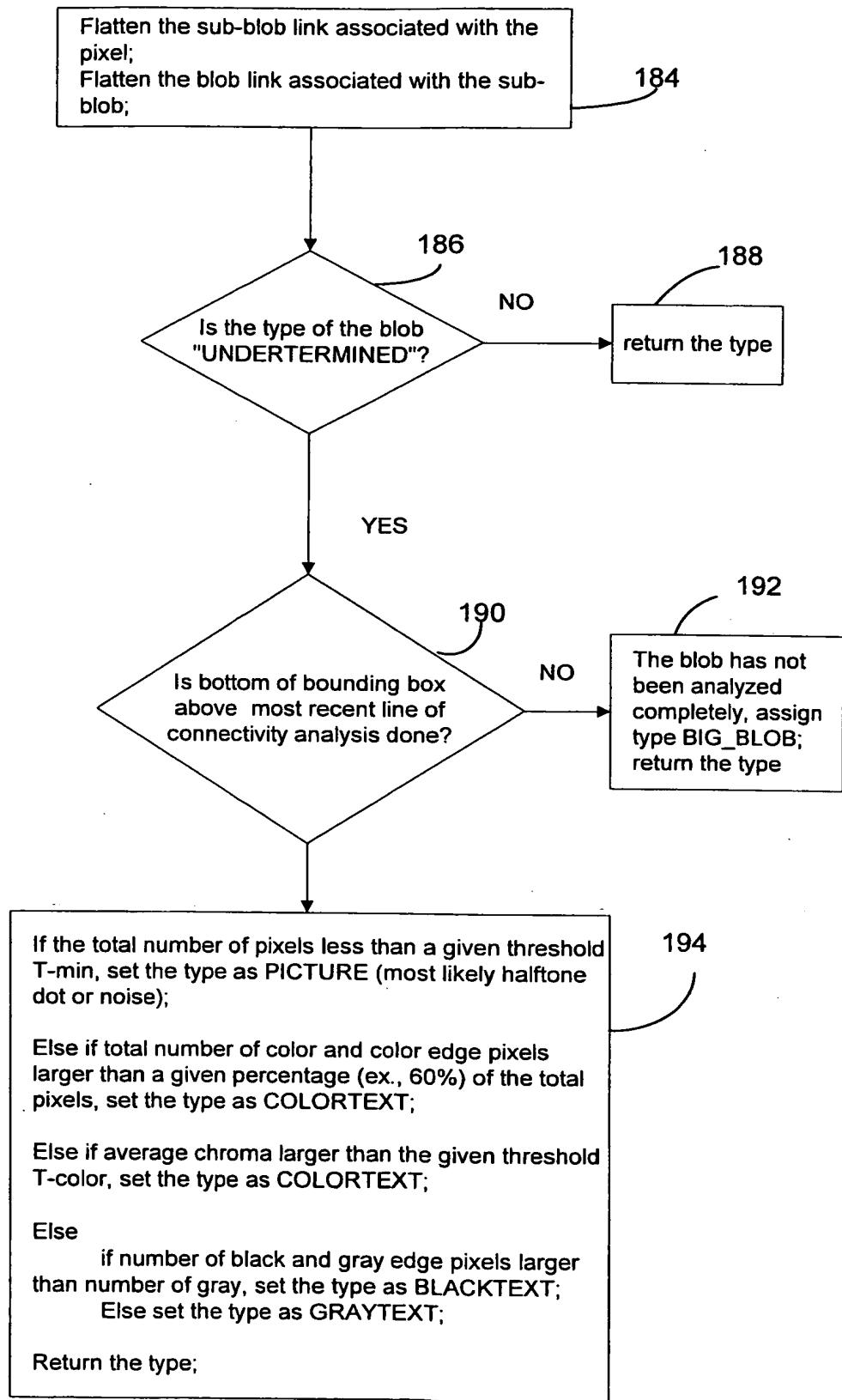


FIG. 14

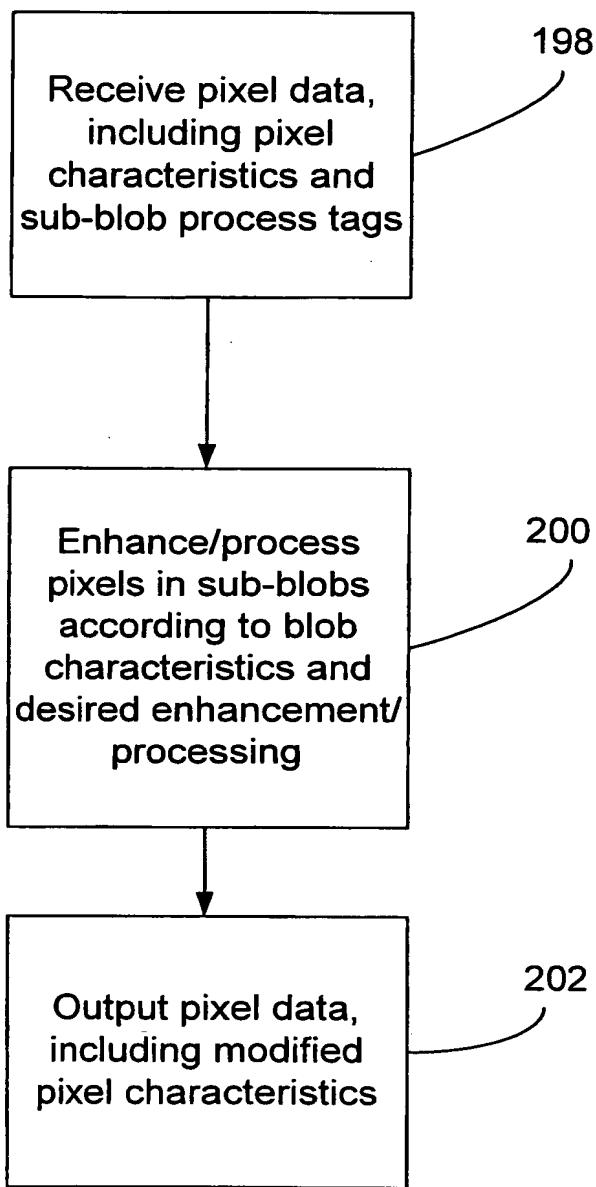


FIG. 15

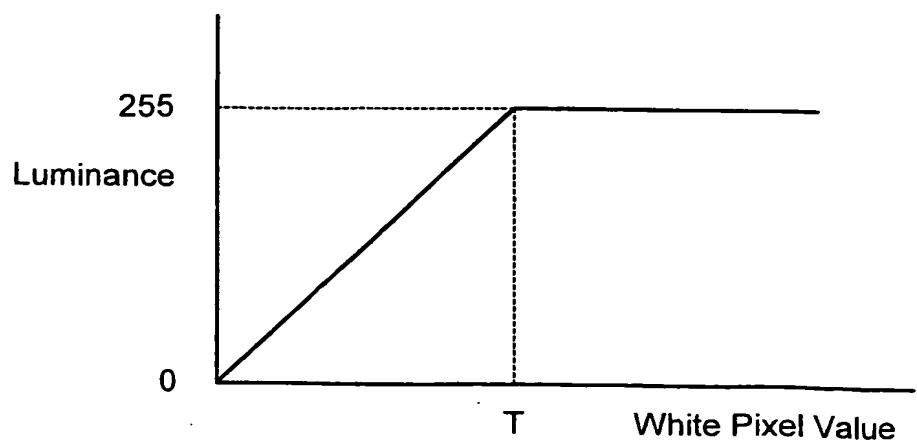


FIG. 16

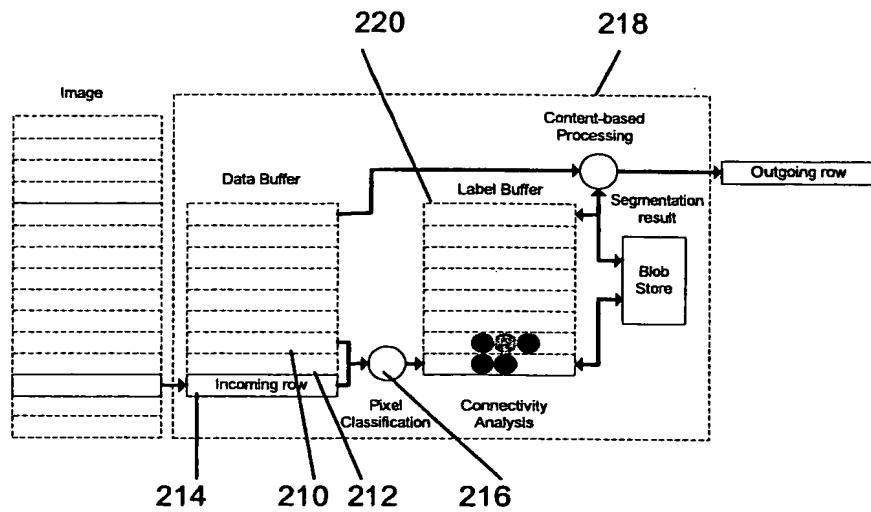


FIG. 17

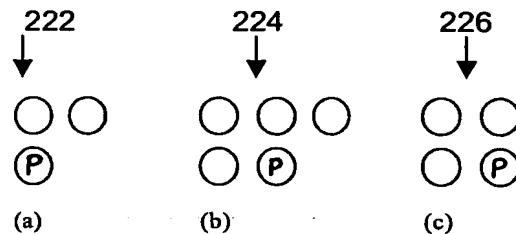


FIG. 18

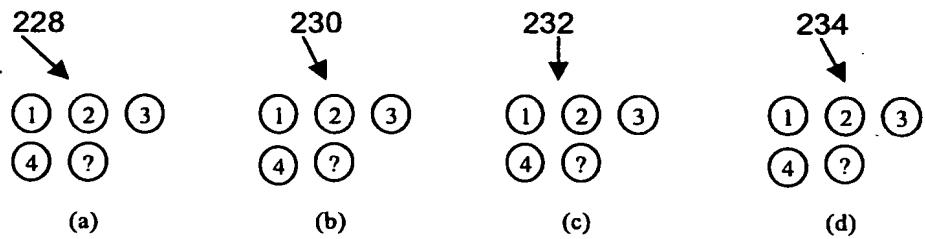


FIG. 20

**Box 1. Pseudo-code for the joint operation.**

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```
Joint ( SubBlob *pSB1, SubBlob *pSB2)
1. Trace pSB1 to the root rtSB1;
2. Trace pSB2 to the root rtSB2;
3. Combine the two root nodes by adding
   attribute of rtSB2 to rtSB1 and in turn
   joining (works the same fashion as this
   one) two blobs if necessary;
4. Delete SBCore associated with rtSB2;
5. Link rtSB2 to rtSB1;
```

FIG. 21

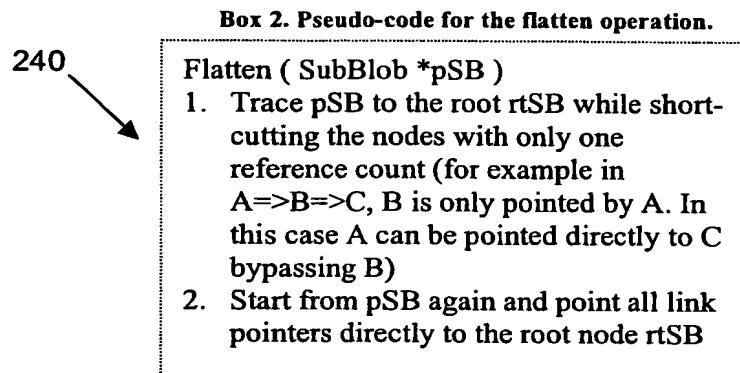


FIG. 19

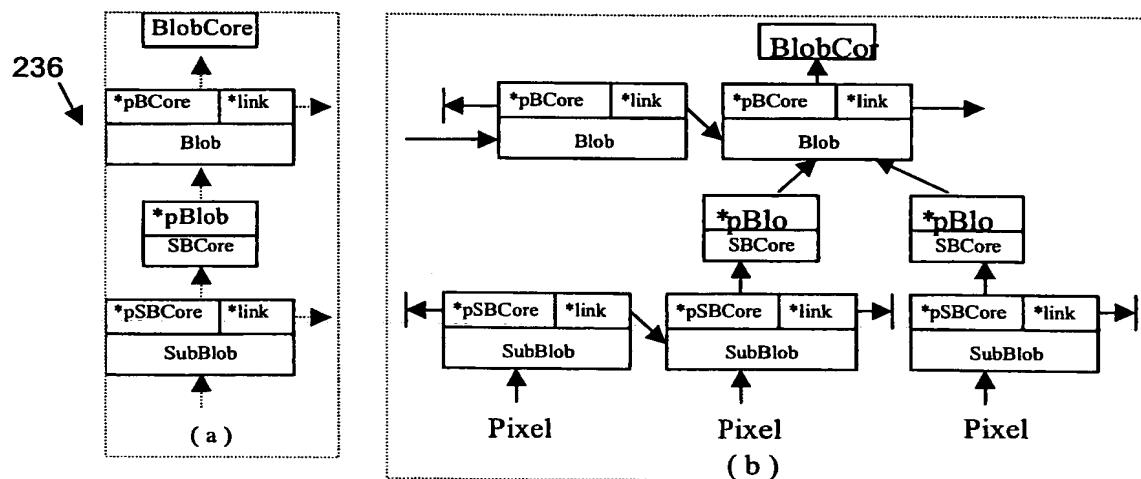


FIG. 22

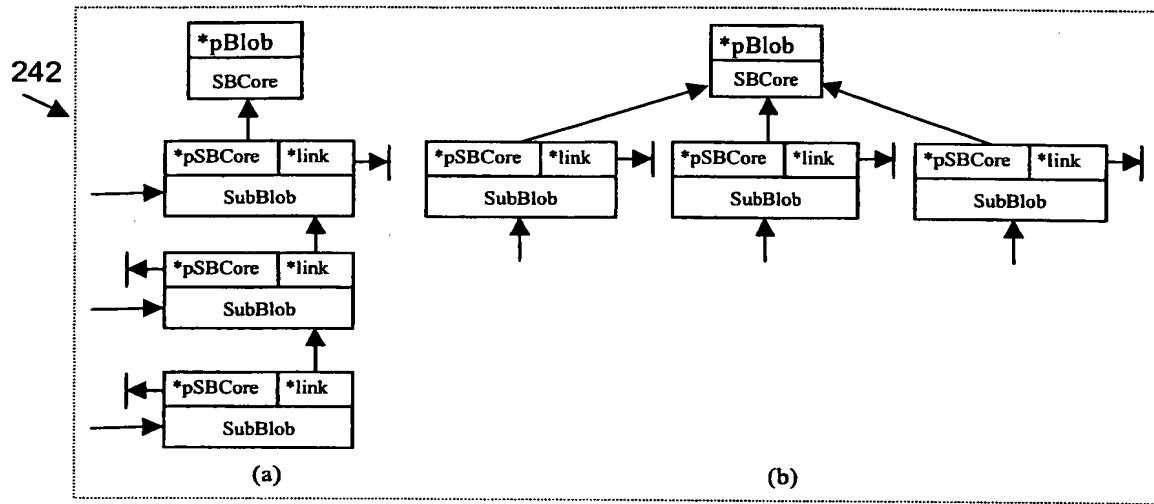


FIG. 23

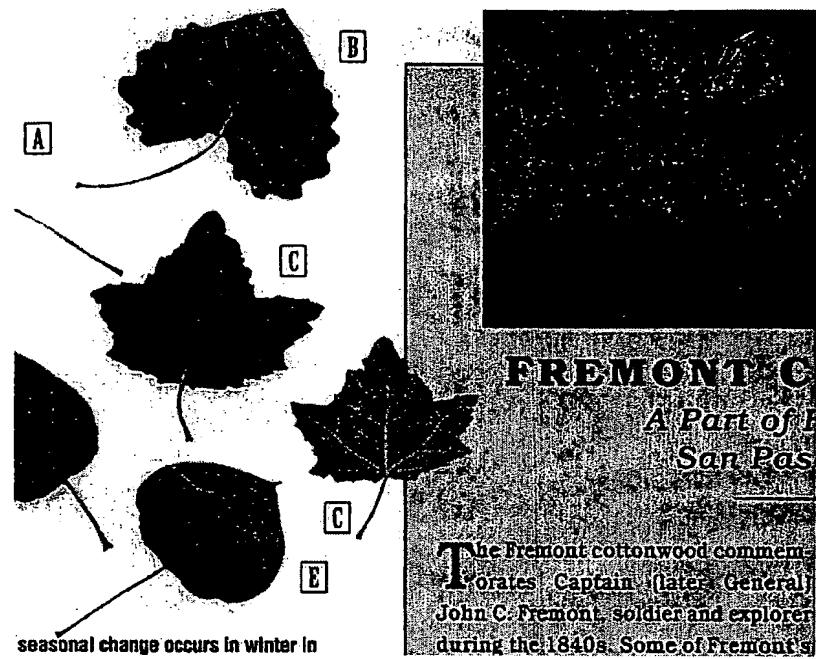
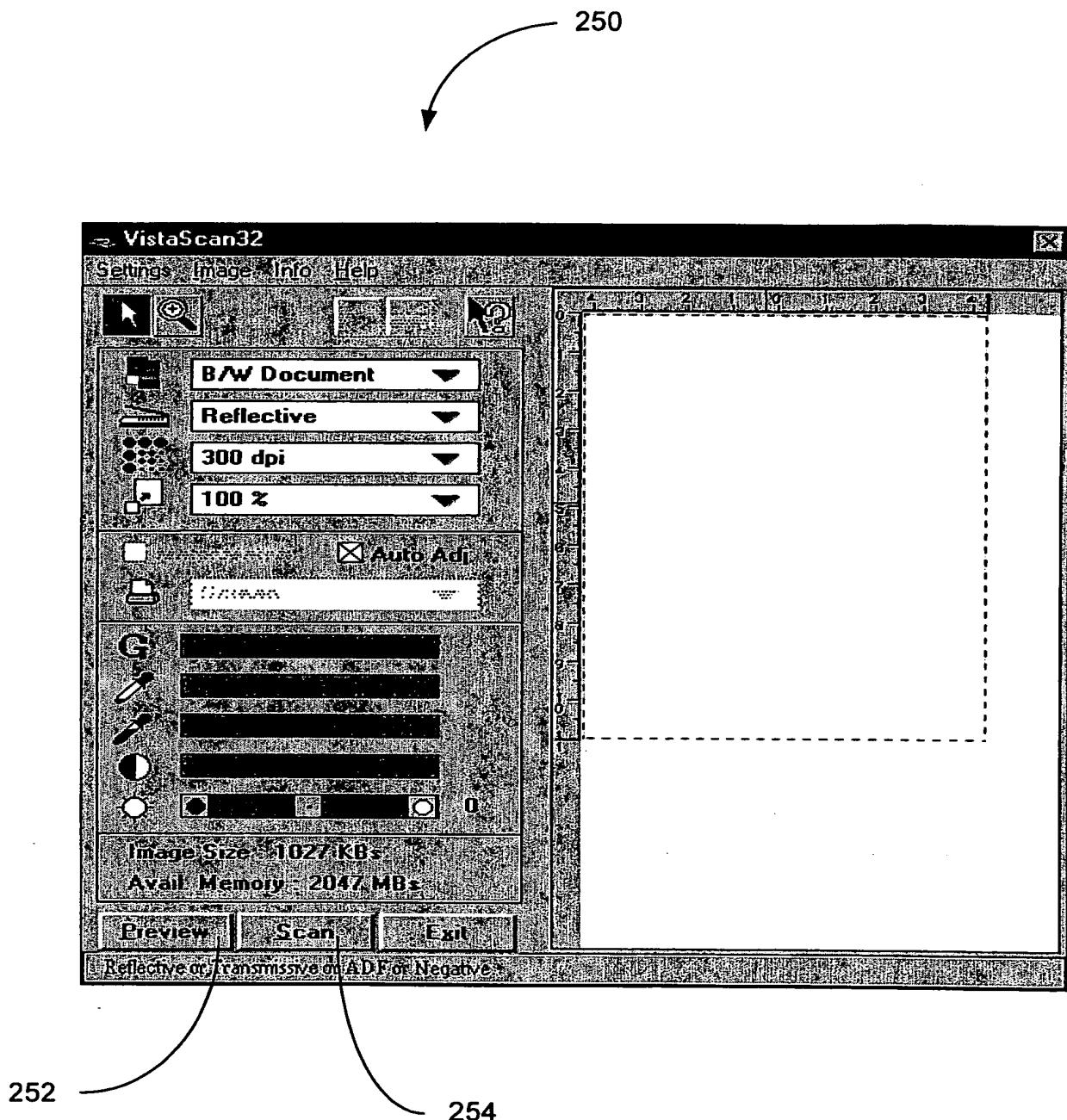


FIG. 24



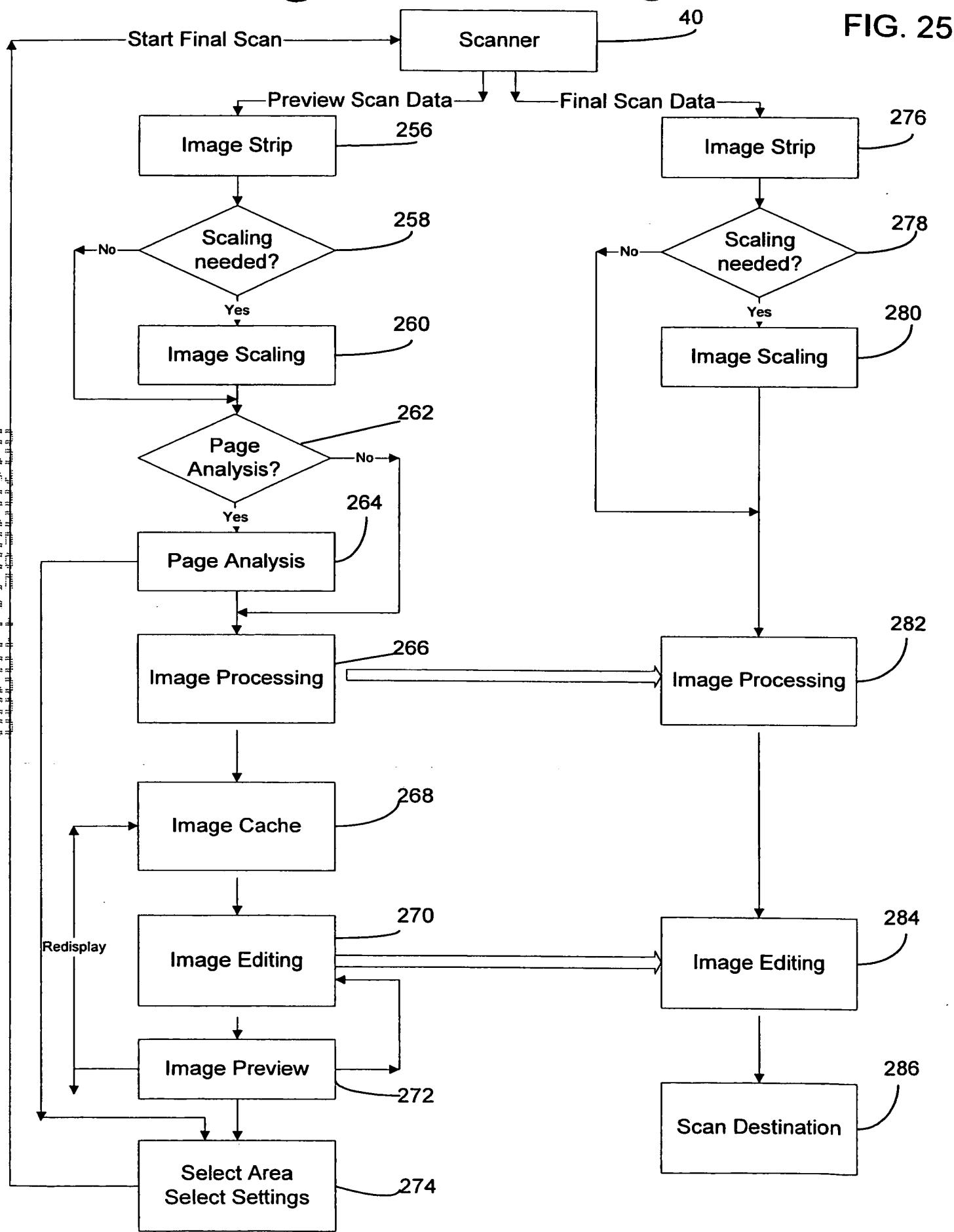


FIG. 26

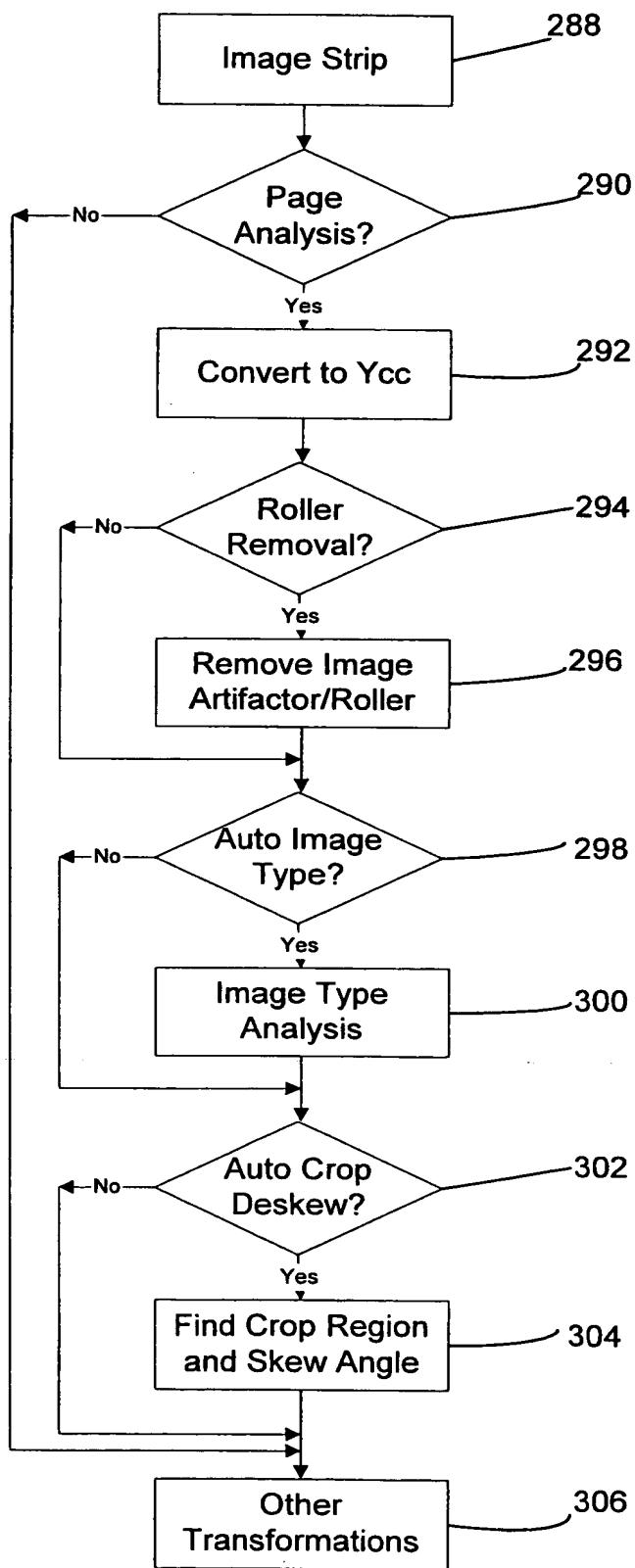


FIG. 28

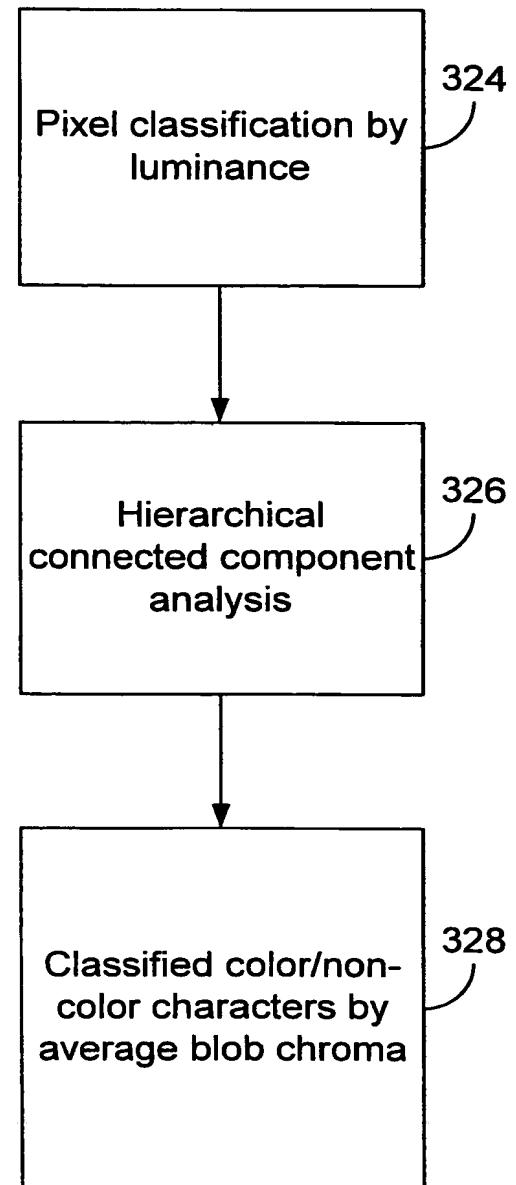


FIG. 27

